CHIRONOMID LARVAE ASSOCIATED WITH WATERSNAILS.*

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Although some work with Chironomid larvae and watersnails has been done in London, so far as the writer has been able to determine, no one in this country has endeavored to work out their relationship. It was during the summer of 1930, while attending the Biological Station of the University of Michigan, that my attention was first attracted to this relationship. Mr. S. B. Talbot, a student in parasitology, was having some difficulty in keeping experimental snails alive and he made numerous dissections in the hope of finding the causal factor in the mortality. In one of these dissections he found an insect larva, which Dr. H. B. Hungerford recognized to be that of a Chironomid. I, therefore, collected and isolated a large number of snails with the hope that some of them were infested, and that a study of the life history of the larva could be made.

All of the collections were made in the Douglas Lake region, Michigan. Douglas Lake proper is of irregular outline, two and one-half miles wide and four miles long, and yielded large numbers of snails along its sandy and rocky beaches at certain points. *Physa ancillaria* (Say), in particular, was very abundant on the sand and rocks of Grapevine Point, usually being covered by two or three inches of water. At Ingleside, I made collections of snails in water from a few inches in depth up to a foot, while at Hook Point the water level varied from a half-foot to a foot or more. In all cases, the snails were brought to the laboratory in water.

On August 4, I found a small red larva, 4 mm. long in a *Physa ancillaria* (Say). As soon as the body of the snail was removed from the shell, the larva emerged and crawled very rapidly to the far end of the dissecting dish. It was very active and would wheel its body around as if to fight the dissecting needle. An attempt was made to get the larva to enter different species of snails, both small and large, but the effort was futile. Sometimes it would enter between the foot and shell of a snail, but it

* Contribution from the Biological Station of the University of Michigan.

never ventured any further and the snail in no case appeared to be inconvenienced.

As I have suggested before, numerous collections and isolations were made during the last of July and the month of August. Either five or six snails were then isolated in a pint bottle containing lake water and a leaf of lettuce for food. The top of the bottle was covered with a piece of plankton-net cloth, which was fastened tight by means of a rubber band. For the welfare of the snails, the water was changed at least once a day and the food every other day. At the end of my stay, August 31, dissections were made of these snails—that is, the ones which had survived—and not a single larva was revealed. A more detailed report on the number and mortality of each species of snails isolated and observed is given in Table I.

Table I. Number and Mortality of Each Species of Snails Isolated and Observed.

Date of collection and isolation	Place of collection in Douglas Lake region	Name of species	Number	Mortality by 8/31/30
7/27/30	Grapevine Point	*Physa ancillaria* (Say)	31	16
7/27/30	Grapevine Point	*Physa heterostropha* (Say)	16	7
8/ 8/30	Ingleside	*Physa ancillaria* (Say)	25	5
8/ 8/30	Ingleside	*Physa parkeri* (Currier)	30	20
8/16/30	Grapevine Point	*Physa ancillaria* (Say)	60†	15
8/21/30	Ingleside	*Physa ancillaria* (Say)	42	17
8/21/30	Ingleside	*Lymnaea stagnalis* (Say)	30	22
8/21/30	Ingleside	*Planorbis companulatus* (Say)	29	8
8/24/30	Hook Point	*Physa ancillaria* (Say)	66	5
		Total	329	115

† Immature forms.

The majority of snails collected, however, was brought to the laboratory in lake water, later killed with hot water, and preserved in 80 per cent. alcohol. These were shipped to the University of Kansas where I made dissections in the fall. Since the snails were killed in hot water, the body of the snail was drawn

to the exterior of the shell. By grasping the foot with a pair of forceps, one could with a certain amount of care and practice, remove the body intact from the shell. The search for the larvae then began with the aid of a binocular. This study revealed only five Chironomid larvae in 5,137 snails, which is a surprisingly small infestation, and might account for the fact that I learned but little concerning their life history during the past season. It may be, however, that the larvae are more plentiful some years than others, or that the infestation may be greater in different localities of the country. A complete record of the collections and dissections of snails made as well as of the larvae found is presented in Table II.

Barnard found that the Chironomid larvae in *Limnaea peregra* enter the pulmonary orifice, and burrow in the mantle eventually reaching the liver.[1] The larvae I obtained from preserved material were all situated in the mantle cavity (see Fig. 1). It is

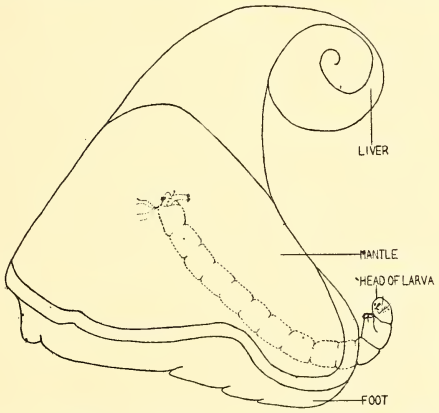

Fig. 1. *Physa ancillaria* showing position of chironomid larva.

interesting to note that these larvae were found in three species of snails in the Douglas Lake region; namely, *Physa ancillaria* (Say), *Physa heterostropha* (Say), and *Lymnaea humilis* (Say). In the case of *Physa ancillaria* (Say), larvae 5 mm. long were found in both mature and immature forms, which were 13 mm. and 7 mm. long, respectively. Finally, I may state that only five Chironomid larvae were found in 5,466 snails, this number repre-

[1] Barnard, K. H. "Chironomid Larvae and Watersnails." In *Entomologist's Monthly Magazine.* Vol. 47. 1911. P. 76.

senting those isolated and dissected as well as the preserved material that was dissected.

The particular Chironomid larva which I found in the snails was determined through the courtesy of Dr. O. A. Johannsen, who places it in the genus *Chironomus* and sub-genus *Endochironomus.* Since as Dr. Johannsen suggests, it is only by rearing that we will be able to determine the species concerned and whether it exists as a parasite or a predator,[2] it is sincerely hoped that some entomologist will solve this interesting relationship practically untouched in this country.

TABLE 2. RECORD OF COLLECTIONS AND DISSECTIONS OF SNAILS

Date of collection	Place of collection in Douglas Lake region	Name of Species							
		Physa ancillaria (Say)	*Physa parkeri* (Currier)	*Physa heterostropha* (Say)	*Physa gyrina* (Say)	*Lymnaea stagnalis* (Say)	*Lymnaea humilis* (Say)	*Lymnaea emarginata* (Say)	*Planorbis companulatus* (Say)
7/31/30	Grapevine Point	20*							
8/ 1/30	Hook Point								24
8/ 2/30	Grapevine Point	22							
8/ 4/30	Grapevine Point	1		1*	8	2			
8/ 4/30	Hook Point	124	4	1				6	
8/ 5/30	Grapevine Point	118*		4			32	39	
		134†					42		
8/ 6/30	Grapevine Point	554†							
8/ 8/30	Ingleside	618	212			601	44	8	170
8/12/30	Hook Point						15		117
8/12/30	Monro Lake				40				
8/21/30	Ingleside	189	81				13*	7	42
8/21/30	Sedge Pool					499			
8/23/30	Grapevine Point	511*†					2		
8/24/30	Hook Point	157	16					2	8
8/28/30	Ingleside	420	196	2				30	1
	Total	2868	509	8	48	1102	148	92	362

* Chironomid larva found.
† Immature forms
N. B.—Total number of specimens examined 5137.

[2] Suggested to writer in letter from Dr. Johannsen.